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September 7, 1957

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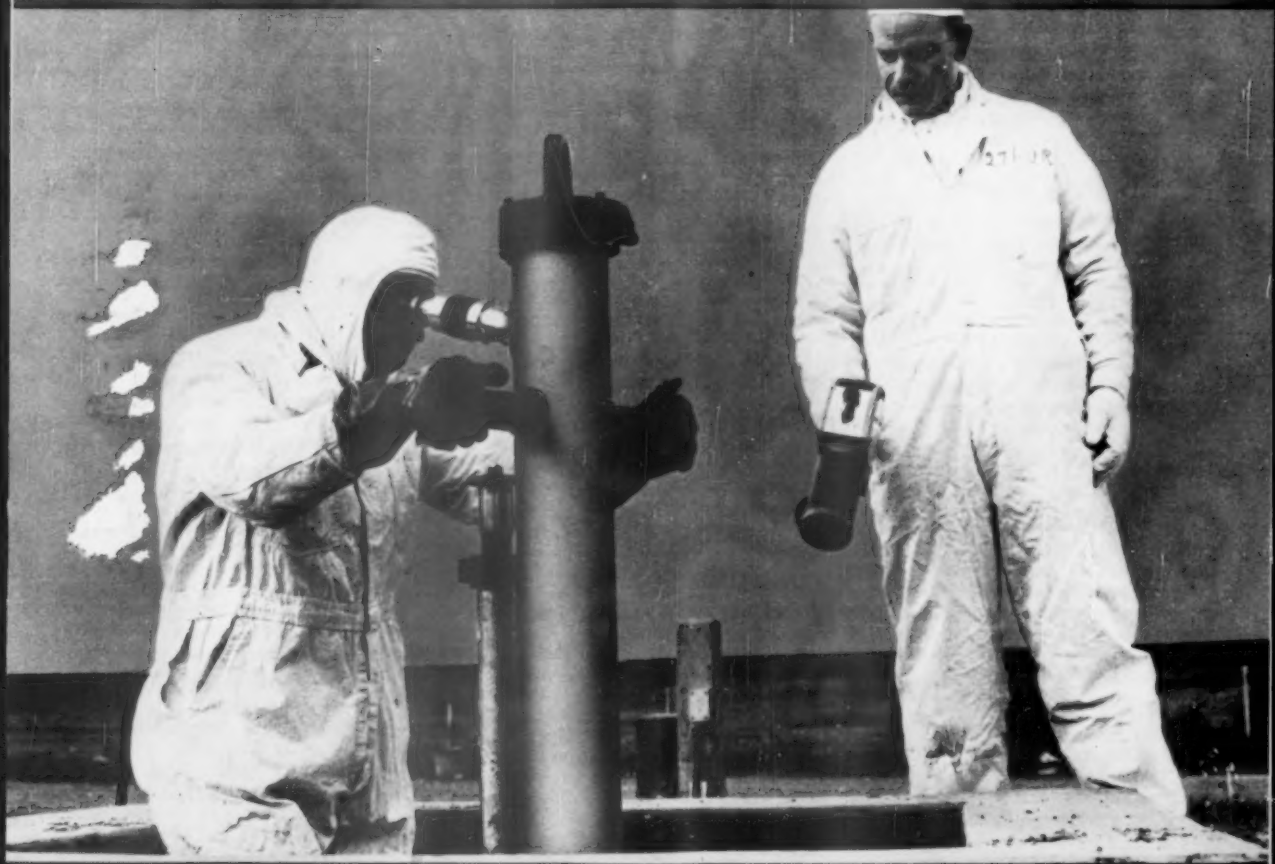
SCIENCE NEWS LETTER®

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Uranium "Hot" Bed

See Page 151

A SCIENCE SERVICE PUBLICATION

Kodak reports on:

film for cases where no other film will do . . . learning to synchronize . . . 25 years in the commercial plastics business

For your own good

It is now possible to walk up to an ordinary film counter and buy a roll of 120 or 620 roll film that is just too fast for your own good. We do *not* recommend the new *Kodak Royal-X Pan Film*, except for special cases involving very poor light conditions, very high shutter speeds, or very small lens openings. Processing it by current commercial photofinishing techniques will lead to unsatisfactory results; instead, one must follow the special processing instructions packed with the film. Measured by the official ASA method, the Exposure Index is 650, but we think you will get along better handling it on the assumption of a 1600 exposure index.

Semi-pro sound movies

Four hundred feet of unexposed 16mm *Kodachrome Film* can be purchased for $24. $14 more gets it processed (and by *us* at that). $10 more puts a *Kodak Sonotrack Coating* along the edge. Now sound can be magnetically recorded on the film by merely projecting it with the *Kodak Pageant Sound Projector, Magnetic-Optical*, while commentary, sound effects, and/or musical background are applied via the handy microphone. Now, if 10% is enough for wastage, you have 10 minutes of movies with sound. Total outlay, exclusive of equipment amortization and talent—$48. If you have planned well, you can impart much information or persuasion in this way, and more vividly than by ink on paper.

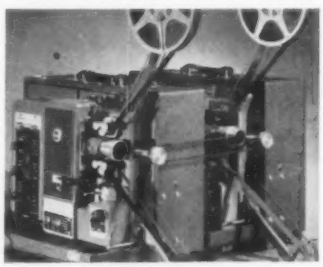
Then ambition sets in. You realize in time that the distinction between a movie with sound and a sound movie can be as noticeable as the distinction between "assistant director" and "assistant to the director."

Synchronization—that's the problem.

If the aforementioned *Pageant* projector could be run at exactly the same speed as the movie camera used, you could take the projector to the scene of photography and with it record lip-synchronized speech and actual sounds. This turns out to be feasible. All you need is a simple braking attachment on the projector and a strobe pattern disk, both of which we can supply, and a little neon or argon lamp.

Still, you are not yet in a good position to compete for the top awards of the Motion Picture Academy of Arts and Sciences. On the other hand, you have paid the Kodak Audio-Visual Dealer only $12.50 for synchronizing equipment.

By now when watching movies at the theater or on television, you are aware of how the film editor keeps switching back and forth between the camera angles and auxiliary shots at his disposal while the sound track flows smoothly on. So back you go to the Audio-Visual Dealer. He has been fully indoctrinated by us in a new re-recording



technique built around a few other extremely inexpensive magnetic recording aids (as simple as the pulley arrangement pictured here) and certain unique design features of the *Pageant Sound Projector, Models MK4 and AV-104M*. He is eager to teach it to you.

If you can't remember the fellow's name, a note to Eastman Kodak Company, Audio-Visual Sales, Rochester 4, N. Y., will bring a quick reminder.

Hooray!

This fall we celebrate the 25th anniversary of our entry into commercial plastics (as distinguished from plastics for photographic film base, which we have been in since 1889). Hooray.

If you share our elation over the occasion, you will permit us to send you a plastic (*Tenite Butyrate*) commemorative medallion depicting one of the first U. S. injection molding machines. This heraldic device marks the historic fact that injection molding of plastics became an art of mankind through our exploitation of the discovery that cellulose acetate, mixed with a plasticizer, could be squirted hot. Hooray!

For sophisticates who look beyond butyrate medallions for their excitement, our plastics story has a slant that even they may find stimulating. That's the part where we mention psychophysics, profess our disdain for color standards in the plastics trade, and irritate our competitors by enthusiastically pushing the idea of custom colors.

The joy that the human race takes in its color vision has brought us prosperity.

Long live *Kodachrome*, *Kodacolor*, *Ektachrome*, *Ektacolor*, and *Eastman Color Films!* Also *Chromspun Acetate Yarn!*

The chromaticity diagram of the International Commission on Illumination—long may it wave!

Long live those gallant fellows of ours who spend their 8-to-5 lives exploring its mathematical properties and conclude that the normal eye is capable of about two million distinguishably different color sensations, half of which are possible as colors of actual objects!

Long live the independently wealthy automotive genius who decides just how much difference from any of the 38,000 extant colors in sturdy *Tenite Acetate*, extra tough *Tenite Butyrate*, and warmly soft *Tenite Polyethylene* it will take to create a certain effect in your wife's mind when she sneaks a peek into the 1959 model while waiting around in the showroom for the service department to make its estimate on overhauling the old heap!

For a reprint of a very recent paper of ours that tells how to build an electronic digital tristimulus integrator that attaches to a recording spectrophotometer and reads off ICI co-ordinates for any color, write Eastman Kodak Company, Research Laboratories, Rochester 4, N. Y. For the commemorative medallion, or for any conceivable color effect in Tenite Plastics, *which are, frankly, the aristocratic family of the plastics age, write Eastman Chemical Products, Inc., Kingsport, Tenn. (Subsidiary of Eastman Kodak Company).*

Prices quoted are subject to change without notice.

Kodak
TRADE-MARK

This is another advertisement where Eastman Kodak Company probes at random for mutual interests and occasionally a little revenue from those whose work has something to do with science

PUBLIC HEALTH

Radiation Limits Unsafe

Results of the first experiments involving radiation effects on human cells indicate the present "safe" dose of radiation may be from three to five times too high.

➤ A SIGNIFICANT number of tomorrow's children will be deformed if today's fathers receive anywhere near the amount of radiation now considered to be a safe amount.

Evidence supporting this comes from the first study ever made on the effects of radiation on normal human cells, reported at the American Institute of Biological Sciences meeting, Palo Alto, Calif., by Dr. Michael A. Bender of Johns Hopkins University, Baltimore, Md. (See pp. 149 and 150.)

The experiments indicate that the ten roentgen "maximum permissible dose" to the reproductive organs from birth to 30 years of age, set by the National Academy of Sciences, is "too high."

In discussing the results of his work to date, Dr. Bender warned, "If the rates of this and other types of radiation-induced damage to human tissues are found to be correspondingly high in further experiments, a sharp revision will have to be made in our estimates of 'safe' doses of radiation." The biologist told SCIENCE SERVICE that he thought the present "safe" limit of ten roentgens probably was from three to five times too high.

The experiments, described as the first done on human cells with known doses of radiation and the amount of resulting damage carefully measured, were conducted on normal kidney cells in tissue culture. The cells were subjected to X-ray bombardment of 25 roentgens and 50 roentgens from a standard X-ray machine used in many American hospitals.

(A routine fluoroscopic examination may result in a radiation dosage equal to those given to the kidney cells.)

What resulted was an increase in the breakage of chromosomes in proportion to the amount of radiation given.

Normally, one chromosome break in 100 cells occurs. Geneticists term this the "spontaneous breakage rate." If this breakage rate were increased because of radiation, as is indicated in the human cell experiments carried out by Dr. Bender, then a significant increase of hereditary defects in future generations can be expected. The amount of radiation required to produce this increase is in question.

But the human kidney tissues used in the experiment showed the following: when exposed to 25 roentgens, roughly six breaks per 100 cells were produced; and at 50 roentgens, upwards of 15 breaks were found.

"The breakage rate found in these experiments is much higher than that which has been generally assumed to occur for such low doses," Dr. Bender told the meeting.

"In fact," he added, "the present experiments, taken by themselves, lend great weight to the belief of many geneticists that there is no 'safe' dose of radiation.

"Careful consideration of whether the benefits to be gained are worth the risk to ourselves and to our descendants should be given to any proposed increase in the amount of radiation we receive."

Studies are now underway on other human cells and on mouse cells, which when matched might give a good standard for comparing the radiation damage suffered by man with more easily conducted experiments with mice.

Dr. Bender pointed out that the study was made on only one particular type of human cell and in tissue culture. He explained that this might leave his findings open to question, because it is not known whether cells in the human body would all react in the same way. However, he added, "There is no reason to believe that they would not."

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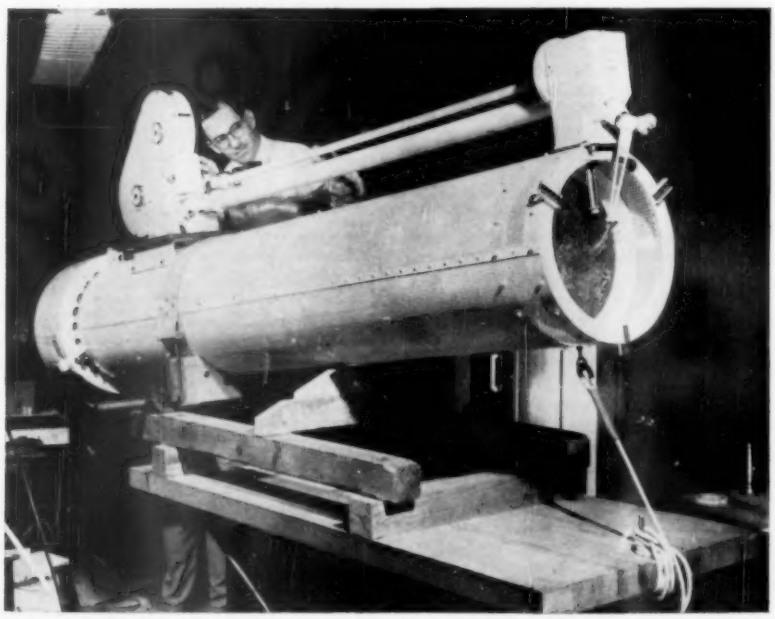

SOLAR TELESCOPE—Pictures taken through this balloon-borne solar telescope, designed and built by Perkin-Elmer Corp., Norwalk, Conn., are expected to be three times sharper than any obtained with even the most powerful earth-bound telescope. Scientists hope to obtain fundamental data on the sun's surface activity.

ASTRONOMY

Plan Unique Photographs Of Sun From Balloon

➤ UNIQUE photographs of the sun from a high-flying unmanned balloon will be taken within the next few weeks.

The Skyhook balloon will be equipped with a powerful, especially designed 12-inch telescope, a light-sensitive pointing mechanism and a motion picture camera. It is expected to rise to heights of 80,000 feet over Minnesota. Once stable there, the camera will automatically take some 8,000 pictures of the sun, one each second.

One giant balloon, equipped with a dummy telescope, has been successfully launched in a test flight that proved the feasibility of the system, developed under Project Stratoscope. Aim of the system is to obtain solar photographs three times clearer than any taken previously.

The project, sponsored by the Office of Naval Research, is directed by Dr. Martin Schwarzschild, Princeton University astronomy professor. It is an attempt to gain a better understanding of turbulence in the solar atmosphere by going above most of the earth's own turbulent atmosphere. Because this planet's air is in a constant state of turmoil, only solar events having a diameter of 600 miles or more can be readily distinguishable.

The new pictures are expected to reveal the true size of the large eddies as well as of smaller ones.

This will be man's first attempt at high-definition, high-altitude vehicular astronomy. An earlier trial at better "seeing" made last spring by the French reached only to 25,000 feet, where the turbulent air of the tropopause, about 40,000 feet, still remains between the telescope and the sun.

Special arrangements are being made to compensate for changes in the telescope's focal length due to solar heating.

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ENGINEERING

"Jets" for Industry To Have Nuclear Uses

➤ THE JET engines that power supersonic jets are now being harnessed for electric power generation.

In the future, jet engines are expected to be the "prime movers" of industry, as well as the means to change the energy from nuclear reactors into usable electrical energy, it was learned at the Pacific meeting in Pasco, Wash., of the American Institute of Electrical Engineers.

The "jet engine," technically a gas turbine, uses the energy from burning, expanding fuel gases to drive a turbine at very high speeds and temperatures. In planes, the hot gases are expelled to create a "jet" that drives the plane, and the turbine serves to increase the speed of the gases through the jet. In generating electric power on the ground, the whirling turbine is linked to an electric generator, and the hot gases are put to a more efficient use.

Tracing the development of the industrial gas turbine since its invention in 1945, K. L. Rieke and W. N. Hornberger of Westinghouse Electric Corporation reported that the gas turbine power generating capacity to be installed in North America during 1957-58 is 180% of that installed during the past 11 years.

The modified "jets" are most popular today as "electrical co-pilots," taking over when the demand for electricity puts too great a load on regular coal- or oil-fed steam turbines. They are also used right along with steam turbines to make a more efficient generating plant, using the waste heat and steam from the steam turbine to increase the power of the "jet."

Preliminary drawings of a proposed nuclear gas turbine have already been made.

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MEDICINE

Mental Patients Treated With Convulsive Vapors

➤ A DRUG that causes violent convulsions when its vapor is inhaled has been tested as a substitute for electroshock treatments for mental patients.

The first four trials of the vapor are reported by scientists from the University of Maryland School of Medicine, Baltimore, and the Air Reduction Company, Murray Hill, N. J., in *Science* (Aug. 23).

The convulsive drug is a type of ether known as hexafluorodiethyl ether and its effects were discovered while similar compounds were being tested for their sleep-producing abilities.

White rats exposed to low concentrations of the vapor began to have convulsions within 30 seconds, but these stopped quickly when the agent was removed from the air.

Its possible value in mental illness comes from its lack of physical after effects. Repeated exposures on subsequent days in animals did not appear to produce any bodily changes.

Four patients suffering from mental disturbances in which electroshock therapy was indicated were subjected to the vapor. Each had a seizure resembling that following electroshock.

A short period of unconsciousness followed the convulsion and then the four patients recovered uneventfully. There appeared to be no clouding of memory. Two patients were more cooperative than they had been before the treatment.

The comparatively simple procedure might be found useful in the treatment of certain mental patients, the scientists, Drs. John C. Krantz Jr., Edward B. Truitt Jr., and A. S. C. Ling, School of Medicine, University of Maryland, and Louise Speers, Air Reduction Company, Inc., Murray Hill, N. J., conclude.

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BIOLOGY

Bacteria Make Amino Acid

A new photosynthetic process has been discovered, biologists learned at their annual meeting. They also heard reports on a plant virus vaccine and the effects of radiation.

➤ A SECOND METHOD by which plants can use the energy of the sun to manufacture food and hence sustain all life on earth has been discovered.

This heretofore unknown photosynthesis process is a shortcut that by-passes the making of sugar and produces protein directly through light energy. It is accomplished by the world's most primitive food factory, organisms known as the photosynthetic sulfur bacteria.

The discovery of the process, which might also exist in higher plants, was reported to the American Institute of Biological Sciences meeting in Palo Alto, Calif., by Dr. R. C. Fuller and I. C. Anderson of the biology department, Brookhaven National Laboratory, Upton, N. Y.

Until now, the scientists explained, there has been shown only one method by which all plants fix carbon dioxide, using the energy of the sun to make sugar and then protein, fats and the other metabolic necessities of life. The method involves adding the carbon dioxide to a sugar phosphate known as ribulose diphosphate. This complex is then split and synthesized into a molecule from which the higher plant builds starch.

The tiny photosynthetic sulfur bacteria are not only capable of using this method for food production, but can also use an alternate method.

It is the discovery of the alternate method that the two scientists have reported.

In the second and newly found photosynthesis process, the bacteria "fix" carbon dioxide onto a three-carbon acid called phosphoenolpyruvic acid to form a four-carbon acid that rapidly becomes another four-carbon amino acid—aspartic acid.

Aspartic acid, the scientists noted, is a basic building block for proteins.

Hence, the primitive plant has the ability to use not only the "regular" method for fixing carbon dioxide, but it can "fix carbon dioxide in a second way which does not make sugars but is a direct method for the production of protein via light energy."

Speculating on the possibility that this second system of fixation might also play a role in the photosynthesis of higher plants, the scientists said that all the enzymes necessary have been found in higher plants. However, the equilibrium seems to be more toward the synthesis of sugar, they noted.

Several Russian workers, Dr. Fuller and Mr. Anderson reported, have recently hinted there is a direct "pathway of the fixation of carbon dioxide for the direct synthesis of proteins as a function of light which occurs in the roots of plants.

"Certainly this system in these primitive bacteria may be the mechanism by which this is going on."

The Brookhaven scientists cautioned that much work is still needed to determine just how these primitive plants convert sunlight into chemical energy in the form of high energy phosphate, but concluded that the bacteria may also present science with a "far simpler system to help understand the actual mechanism" of the conversion.

Plankton Spread Fallout

➤ PLANKTON, tiny sea plants and animals, can provide scientists with a measuring stick for determining the effects of A- and H-bomb radioactive fallout on life in the Pacific Ocean, Dr. Lauren R. Donaldson, director of the University of Washington's Applied Fisheries Laboratory, told scientists at the meeting.

These near-microscopic organisms concentrate the ocean's radioactivity by taking in radioactive materials. They also control the rate of the radioactivity's westward drift since they move much slower than the water, or about half the speed of the North Equatorial Current of the Pacific.

The results of two pioneering oceanographic surveys in which fallout radioactivity from nuclear test shots was traced across nearly 500,000 square miles of Pacific waters were reported for the first time. (See p. 147.)

One of the unique findings of the surveys was the source of the radiation detectable in plankton samples. Radioactive iron, manganese, cobalt and zinc, non-fission products in which radiation had been induced by H-bomb or thermonuclear explosions, accounted for 90% to 100% of the radiation detectable in some samples.

Dr. Donaldson said his studies seem to show that the products of nuclear fission decay or are rapidly lost in the ocean. Non-fission isotopes, the products of induced radiation, are of "controlling significance in aquatic radiobiology."

Hundreds of samples of plankton and water were taken for the surveys, which had been requested by the Atomic Energy Commission's division of biology and medicine. The surveys were conducted during and after the operation Redwing series of nuclear tests at Bikini and Eniwetok. One was made in June, 1956, while the tests were in progress, the other in September, six weeks after the tests were completed.

During the June survey the average value for radioactive material found in plankton was 7,100 times the average surface water value. In September the average ratio of plankton activity to sea water activity was 2,500 to 1. June sampling showed radioactivity was "well within" the test area; by September the fringes of the tagged water mass, with faintly detectable activity, were some hundreds of miles westward toward Guam.

Plankton, found floating or weakly swimming in the ocean, are of particular interest to radiobiologists since they are the base of the oceanic food chain. They are a food source for larger fish that in turn are eaten by humans.

Plant Virus "Vaccine"

➤ U. S. ARMY scientists have perfected a "vaccine" from rice for protecting plants against virus infections. It might also be effective against viral diseases in humans, scientists at the biologists' meeting were told.

The disclosure that extracts from rice plants can inhibit the growth of some plant viruses came at a time when most Americans are worried about getting a vaccine to protect themselves against the Asian influenza virus.

Cautioning that the promising plant "vaccine" has been successful in laboratory and greenhouse experiments only, Army scientists Lt. Thomas C. Allen Jr. and Dr. Robert P. Kahn said that they have high hopes their find will have widespread use.

A majority of the experiments were conducted by inoculating Pinto bean plants with tobacco mosaic virus. Some of the plants were then dipped into solutions containing rice extracts. In most cases, the treated plants grew and remained healthy while untreated plants died or were severely damaged.

The Fort Detrick, Md., scientists used

MEASURING RADIOACTIVITY— Dr. Arthur D. Welander of the University of Washington takes a sample of below-surface waters by using a Nansen bottle. Designed to close automatically at different depths, the bottles provided samples at 75, 150, 225 and 300 feet at each station during a mid-Pacific survey of radioactive contamination of ocean waters. Samples of plankton were taken.

different parts of several varieties of rice, including "juice" from crushed leaves, and rice polish, the by-product remaining after rice kernels are milled. The rice polish proved most effective.

Lt. Allen and Dr. Kahn also experimented with other viruses on the Pinto and Black Valentine bean plants and reported up to 100% inhibition of the disease.

They noted that the following implications can be attached to their discovery:

1. Rice polish amounts to an "immunizing" of beans under greenhouse conditions against several types of virus diseases, much like preventing disease in humans and animals by vaccination.

2. It might prove to be a more rapid control than hunting for resistant varieties of plants.

3. The rice by-product might offer wide-scale treatment of plants against viral diseases.

4. It might also be effective against virus diseases of humans and animals.

Sea Blows Bubbles

➤ THE BUBBLES in ocean water that cause a foamy surface are sometimes formed in deep layers, a Navy scientist told biologists at their annual meeting.

Qualitative studies of bubbles, he noted, can be made while "washing dishes, taking a bath, or even sipping a drink at the bar." However, because bubbles are of interest to both marine biologists and underwater sound specialists, Dr. E. C. LaFond of the U. S. Naval Electronics Laboratory, Point Loma, Calif., went to the ocean itself for his study.

Some are formed, he found, from sea floor gas seepage, fish "burps," decomposition of organic matter. Others result from breaking waves, but these do not extend below 20 feet. Some bubbles are formed under sea surface slicks. Others are produced by the generation of oxygen by photosynthetic processes of plankton, and these bubbles are then displaced to the surface by internal waves.

Cell Study Tells Sex

➤ THE SEX of human embryos can now be determined as early as the third week by sex chromatin studies, Dr. Emil Witschi, State University of Iowa, Iowa City, reported to the biologists' meeting.

This shortens the time needed to identify human sex by about four weeks, he explained.

"Questions about the age at which human embryos differentiate into males and females have been much debated during the past 100 years, but specialists generally admitted that sex was not recognizable before the seventh week of embryonic growth, even under the microscope," Dr. Witschi reported.

A developing embryo can also switch its sex from male to female or vice versa. These reversals occur occasionally in humans and come from such conditions as overripeness of the egg at fertilization.

The sex chromatin technique used was developed by Dr. Murray Barr, a Canadian neurologist who found that the nuclei of cells taken from an embryonic heart differed according to the sex of the embryo.

Dr. Witschi tried the same method on a number of preserved human embryos, all less than one inch in length, and found that the developing sex could be recognized well before the differentiation of the sex glands.

Two years ago Dr. Witschi and an associate, Dr. C. Y. Chang, reported that they could experimentally reverse the sex in the African toad Xenopus. Male embryos of the toad had been changed into egg-laying females by giving them estradiol, a female hormone.

Need Biotin in Pregnancy

➤ THE VITAMIN biotin is a must in the diet of pregnant mothers. A biotin-deficient diet can result not only in a termination of the pregnancy, but in the production of smaller and lighter babies suffering from heart abnormalities, damaged livers and underdeveloped kidneys.

This has been shown in experiments with white rats, Drs. William A. Cooper of West Texas State College and Sidney O. Brown of Texas A. and M. College reported to the biologists.

Female rats were made deficient in biotin, normally supplied in the human diet by egg yolk, tomatoes, yeast, cane molasses and other foods, by feeding them a purified diet containing raw egg white. A substance in egg white combines with the vitamin and prevents it from being absorbed from the intestine.

Mother rats fed the experimental diet for five to seven weeks before mating produced offspring that were smaller in size and lighter in weight than those produced by normal mothers. Those rats on the diet for from 12 to 20 weeks before mating produced no offspring.

The smaller newborn rats that were produced had certain heart abnormalities, damaged livers and kidneys that failed to develop properly and "apparently would not function satisfactorily," the scientists said.

Biotin, Drs. Cooper and Brown concluded, must now be added to the lists of vitamins, such as A, K, E, B-2, folic acid, B-6 and B-12, recognized as "factors essential for the maintenance of pregnancy and the production of normal offspring."

Bone Cancer From Tests

➤ SOME HUMAN beings may be presently in danger of developing bone cancer and possibly leukemia as a direct result of nuclear weapons testing.

This was hinted at during a press conference attended by five of the nation's foremost authorities on radiation effects and fallout problems at the biological sciences meeting.

A recent study has shown that the unleashing of 20 more megatons of fallout could tip the scales for some individuals and put them at or over the "maximum permissible for the human body concentration" of cancer-causing strontium-90, Dr. Curtis Newcombe of the U. S. Radiological Defense Laboratory, San Francisco, said.

But 20 more megatons may already have been unleashed.

Dr. Newcombe explained the study was based on the amount of fissionable material from U. S. weapons testing alone. What Russia and England have added to the fallout statistics is not known. The U. S. figures, it is estimated, show 50 megatons of fallout have rained down on earth and carried with them the cancer-causing radioactive element, strontium-90.

This element finds its way into the human body in the water we drink and the food we eat. Just how much depends on the amount of calcium present also. The more calcium, Dr. Newcombe explained, the less strontium-90.

Dr. H. Bentley Glass of Johns Hopkins University, Baltimore, Md., said it is the scientific consensus that if ten megatons of fallout were dumped on the world annually, the safe limit for strontium-90 would still be preserved.

Whether leukemia can be caused by strontium-90 is anybody's guess, the scientists said, but there is always the possibility that it could.

Other scientists participating in the conference were Drs. George W. Beadle of California Institute of Technology and chairman of the National Academy of Sciences' committee on genetic effects, Arnold H. Sparrow of Brookhaven National Laboratory and Carl Swanson of Johns Hopkins University.

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HORTICULTURE

Smog Reduces Growth Of Citrus Trees and Fruit

➤ SMOG HAS been pin-pointed as causing substantial weight losses in grapefruit and lemon seedlings, reports Dr. O. Clifton Taylor, horticulturist at the University of California, Riverside.

The effects of both artificial and natural smog were studied.

The dry weight of grapefruit seedlings exposed to artificial smog was reduced 17%. Fresh weight was down 12%. Lemon seedlings suffered greater losses: dry weight was cut 37% and fresh weight dropped 33%.

Natural smog affected trees growing at the Los Angeles State and County Arboretum, Arcadia, to the extent of reducing their growth by 20%, Dr. Taylor has reported.

No visible symptoms of leaf injury were apparent, he said. However, in melon seedlings, exposed to synthetic smog, there was seven times as much leaf drop as in plants of the same type and age grown in purified air. Smog may thus be a possible explanation for leaf drop becoming such a serious problem in the Los Angeles basin over the past four years.

The grapefruit and lemon seedlings were grown in an artificial smog made by reacting ozone with hexene vapor. The smog was kept "closely comparable" to Los Angeles' average daily smog, with an index of about 0.2 parts per million.

Science News Letter, September 7, 1957

AEROBEE-HI—This single stage "boosted" rocket is one of more than 40 sounding rockets being launched during the International Geophysical Year. Aerobee-Hi, produced by Aerojet-General Corp., Azusa, Calif., is shown being thrown spaceward from an especially constructed "igloo" at Fort Churchill, Canada. It holds an altitude record of 193 miles.

ENGINEERING

Uranium-Bearing Sludge Recovered From Storage

See Front Cover

➤ THE COMPLETION of a salvage job that will provide many tons of critically needed uranium has been announced by General Electric Company, operator of the Atomic Energy Commission's Hanford plant in Richland, Wash.

The uranium had to be extracted from the highly radioactive materials with which it was stored in underground waste storage tanks. Some of the material, stored since World War II, had settled as sludge. Engineers broke up the hard deposits with streams of water from high pressure hoses so that it could be pumped out.

During the salvage work radiation from the tanks handicapped the entire operation. Periscopes, as shown on the cover of this week's SCIENCE NEWS LETTER, were inserted into the tanks so that the progress of the sluicing operations could be observed. Rigid standards of safety were maintained to protect workers from radiation.

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RADIO

Saturday, Sept. 14, 1957, 1:45-2:00 p.m., EDT

"Adventures in Science" with Watson Davis, director of Science Service, over the CBS Radio Network. Check your local CBS station.

Dr. Floyd S. Daft, director of the National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Bethesda, Md., will discuss "Arthritis and Metabolic Diseases."

MEDICINE

'57 Flu Cases Unlike 1918

➤ THE INFLUENZA epidemic threatening to hit the U. S. this fall will not be very much like the deadly one that killed more than 500,000 Americans during the winter of 1917-18, Dr. C. C. Dauer, chief of the influenza reporting center, U. S. Public Health Service, Washington, told SCIENCE SERVICE.

"We cannot assume that the same thing is going to happen this time," he said.

About the only similarity between the two is that there were isolated outbreaks of the illness during both the summers preceding the mass outbreaks.

The present epidemic has been watched and much more is known about it than was ever known about the 1917-18 epidemic.

There were no facilities at that time to identify the various types and strains of virus that can cause influenza. Even now, researchers are not sure which one actually caused the earlier epidemic. (See p. 152.)

It appeared to spring up in many parts of the world at the same time, rather than start in Asia and circle the globe as the present one is doing.

The antibiotics now available will make a big difference in the death rate from complications following flu, but they may not be the cure-all many people expect them to be.

It all depends on what bacteria cause the pneumonia often following influenza, since some are resistant to the newer drugs.

Pneumonia can be caused by several organisms, particularly staphylococcus, streptococcus, and pneumococcus. The streptococcus and pneumococcus organisms can be arrested with antibiotics, but the staphylococci frequently are resistant to them and thus create much more serious, and difficult to treat, illnesses.

What type pneumonia an individual may get depends on which bacteria happen to be prevalent in his area at the time.

So far there have been a few reported deaths from staphylococcus pneumonia developing after a flu attack, Dr. Dauer said.

The rush for influenza vaccine is on now, but people may have to be urged into getting their shots after the first scramble, Dr. William D. Stewart, assistant to the Surgeon General, U. S. Public Health Service, told state and territorial health officers meeting at the National Institutes of Health, Bethesda, Md., to discuss the flu situation.

Polio vaccine experience has shown people do not readily bare their arms to the needle unless constantly reminded of the importance of doing so, he told the health officials.

Encouraging people to get vaccinated and keeping up their desire to do so until the vaccine can be supplied may be a tough job for all health departments.

The public needs to know there is not going to be enough vaccine for everybody for a while and those who take care of the sick or provide essential community services should get the vaccine first.

Science News Letter, September 7, 1957

EDUCATION

Russian in High School

➤ RUSSIAN has been selected as the second most important scientific language by one of England's new secondary technical schools.

School authorities advised parents of students at the Hatfield School, near London, that the first language for youngsters receiving heavy science instruction should be German. Even this first language choice was a departure from tradition, as French had been the first foreign language for the older grammar schools.

In making the second choice, parents saw the value of breaking with tradition even further when they selected the language which opens Soviet science to their children.

Hatfield School is only three years old. The technical schools are the newest of the three-part secondary school system of Britain. Secondary education includes youngsters from the ages of 11 to 15. The oldest of the secondary schools are the Grammar Schools which are college preparatory and academic. "Grammar" in England means Latin grammar and the curriculum is strong in the classics. Competitive examinations select the top 20% of the 11-year-olds who enter the grammar schools. The majority of English children attend secondary modern schools which have developed since World War I.

The Education Act of 1944 brought about England's newest state-supported schools, the secondary technical schools. Like the grammar schools, these are selective in their enrollment. They differ from the grammar schools in replacing classics with science emphasis, and bear a relationship to the industry or commerce of the neighborhood. A broad program, however, prevents their providing a narrowly vocational training.

The development of the technical school is coupled with the growing importance of technicians in English industry. Britain, as well as the United States, has a grave shortage of engineers, who have attended the grammar schools and go on to the universities.

The graduates of the technical schools usually go to work after completing their secondary education and their military service. But reaching the legal age for leaving school, now 15 but in the process of being raised to 16, does not mean the end of education for most of them. Many take further education one day a week at the county colleges on time released by their employers. The large enrollments of these free schools is closely tied to England's efforts to raise the compulsory school age to 16 as soon as staff and facilities are sufficiently increased.

Science News Letter, September 7, 1957

VIROLOGY

New Method Permits Faster Flu Diagnosis

➤ A FASTER WAY of identifying the influenza virus that will figure in the current Asian flu situation is reported by John Vogel and Dr. Alexis Shelokov, National Institutes of Health, Bethesda, Md., in *Science* (Aug. 23).

Present laboratory methods usually take approximately six days for positive identification, but the new technique can reduce the time to only two days. Because of this, suspected cases of the new flu sweeping the country can now be confirmed more rapidly than before.

Material from throat washings of these suspected cases is added to a thin sheet of monkey kidney cells and the virus is allowed to parasitize the cells. Then, red blood cells taken from guinea pigs are added to the culture and if they clump together it indicates that an agglutinating virus is present.

The final step is to find out exactly what strain of virus is involved and this is done with the use of an antiserum.

An antiserum will cause the culture material to agglutinate or clump when the culture contains the same virus as that used to make the antiserum.

The test has been proved as reliable and much quicker than the older one which required the use of embryonated chicken eggs.

Science News Letter, September 7, 1957

PHYSIOLOGY

Frozen Animals Brought To Life by New Method

➤ A "REWARMING" technique that may speed the day when a living human can be safely frozen for weeks at a time has now been found successful in animals.

The rewarming method was used on laboratory rats that had been kept at near freezing temperatures for as long as one hour after their heart beats and breathing had stopped.

It is reported by Dr. John Hunter, Defence Research Medical Laboratories, Toronto, Canada, in the *Canadian Journal of Biochemistry and Physiology* (Aug.).

The essential parts of the method are to have the animals breathe a high concentration of carbon dioxide gas while they are being cooled and then to revive them with artificial respiration or ventilation, using a high concentration of oxygen.

Unless forced breathing is maintained during the initial stages of warming, normal respiration will not return, Dr. Hunter reports.

Until recently, it was thought that cooling mammals this much would be fatal. Since 1951, other scientists have been able to reanimate rats cooled to near freezing, but they believed it was imperative to rewarm the chest wall first.

In this way, it was thought that the metabolism of the rest of the body would be kept low until a functioning heart could re-establish blood flow.

With artificial ventilation, however, the chest rewarming is unnecessary.

As the body temperature approaches freezing, breathing slows down and stops. Then the regular beating of the heart is lost, although there are still occasional beats every minute or so. Finally, the heart stops completely.

With rewarming and artificial ventilation, heart rhythm returns in six to ten minutes followed by regular breathing in another 20 minutes or so.

Science News Letter, September 7, 1957

PSYCHIATRY

Untreated Mentally Ill Far Outnumber Patients

➤ THE MENTALLY ill in New York City who are not receiving any treatment far outnumber those being treated, Drs. Leo Srole and Thomas S. Langner of Cornell University Medical Center reported to the meeting of the American Sociological Society in Washington, D. C.

This was found in a survey of one residential section of Manhattan which the doctors call "Midtown." Midtown has a population of 175,000. The investigators first made a census of patients, counting all those receiving treatment privately or in psychiatric clinics or mental hospitals. This rate of patients under treatment has been assumed by physicians and the public to indicate the number of persons who are mentally ill.

But then they went on to interview a probability sample of 1,660 persons between 20 and 59 years of age. Two psychiatrists made an evaluation of the mental health of these persons.

The number of untreated mentally disturbed, they found, far outnumber those getting psychiatric care.

The number of patients, the Cornell doctors conclude, bears no regular, nor even approximate relationship to the prevalence of mental disturbance.

Science News Letter, September 7, 1957

RADIO ASTRONOMY

Jupiter's Broadcasts Show Planet's Ionosphere

➤ THE RADIO NOISE broadcast by the planet Jupiter shows the planet has an earth-like ionosphere, three scientists have reported.

By tuning in on the radio waves from Jupiter at 18 megacycles, compared to the kilocycle range of standard broadcast bands, they found the sources on Jupiter are localized and not planet-wide. This discovery tends to support the theory the broadcasts result from electrical storms in Jupiter's atmosphere resembling lightning on earth.

From studies of the radio signals, they conclude that the electron density in Jupiter's atmosphere was about one million every cubic centimeter, which is about the same as for earth.

The studies are reported in *Nature* (Aug. 24) by Drs. C. H. Barrow, T. D. Carr and A. G. Smith of the University of Florida.

Science News Letter, September 7, 1957

IN SCIEN

BIOLOGY

Amino Acid Increases Tumors in Fruit Flies

➤ THE PROPORTION of the amino acid tryptophane in the diet of fruit flies has a direct bearing on the number of inherited tumors they develop.

This has been demonstrated in research by Herbert Stein and Dr. Taylor Hinton, University of California at Los Angeles zoologists.

Fruit flies were raised on a chemically-defined medium so that their diet could be rigidly controlled. It was found that practically no tumors developed with the smallest amount of tryptophane in the diet that would support life.

As the amount of tryptophane was increased, the number of individual flies showing tumors increased in a linear manner until nearly 100% showed tumors.

The UCLA investigators had previously established that the fruit fly could not synthesize tryptophane but must obtain it from food. They said that the tumor-inducing agent is probably an immediate by-product of the amino acid.

Science News Letter, September 7, 1957

WILDLIFE

U. S. Rules Out Electronic Bird Calls for Hunting

➤ ELECTRONICS has been banned from the duck hunter's paraphernalia beginning with the 1957-58 season, the U. S. Department of the Interior has announced.

The "deadly effectiveness" of electronic bird calls or sounds, which pose the potential threat of excessive kills, thus seriously depleting the numbers of migratory game birds, is given as the reason for the ban. Recordings and amplifications of goose or duck calls produced by conventional calling devices may not be used.

Canadian hunting laws also prohibit using these devices.

The penalty for their use in the United States is set, as a maximum, at six months in jail or a $500 fine, or both.

At the same time, the Department cautioned hunters that new limits have been set on the number of ducks and geese that can be taken by American hunters and shipped from the Canadian provinces of Alberta, British Columbia, Manitoba and Saskatchewan. Twenty-five ducks and ten geese is the season's limit for importing to this country. From the rest of Canada the hunter's bag will be limited to 16 ducks and ten geese per calendar week when he wants to bring the birds into this country.

Americans planning to hunt migratory game birds in Canada or in the United States are urged to familiarize themselves with the new regulations.

Science News Letter, September 7, 1957

CE FIELDS

MEDICINE

College Students Show No Diphtheria Immunity

➤ A ROUTINE diphtheria "shot" is needed by many students entering college, Dr. Ruth E. Boynton, Dr. Donald W. Cowan and Paul Rupprecht, University of Minnesota Health Service, Minneapolis, report in the *Journal of the American Medical Association* (Aug. 24).

A survey of new students entering the University in one year disclosed that nearly half of them had no immunity against the dangerous disease. This was in spite of the fact that the state of Minnesota has had a long-time program of diphtheria immunization.

These findings substantiate other studies that have shown adults to have a high degree of susceptibility to diphtheria.

Susceptibility was tested with the standard Schick test and over 47% of the students gave a positive reaction to it. A positive reaction means that the body has too little or no immunity.

Those more than 20 years old were more susceptible than younger persons, and of those between 20 and 24 years of age, the men were more susceptible than the women.

All of the students who were Schick positive were immunized against the disease. In the past, the possibility of severe reactions has always been a deterrent to inoculating adults but the student group responded well.

Many of them got mild reactions to the shot but they were not severe enough to rule out the routine use of the inoculations, the authors conclude.

Science News Letter, September 7, 1957

MEDICINE

Amnesia Victims Usually Get Memory Back Easily

➤ SUDDEN LOSS of memory, or amnesia, is a temporary condition that usually disappears without treatment in a few days, Drs. Alexander Kennedy, University of Edinburgh, and Joseph Neville, King's College, Newcastle upon Tyne, report in the *British Medical Journal* (Aug. 24).

A study of 74 cases of amnesia that turned up at either hospitals or police stations showed that simple psychotherapy, such as suggestion, directed discussion, or quick hypnosis could bring the patient's memory back rapidly.

Amnesia victims are surprisingly easy to hypnotize and can then be made to relive incidents in their past, while supplying a running commentary about them. The subjects are brought out of the hypnosis while talking about themselves and realize that their memory has returned.

Amnesia patients seem to be flying a distress signal and throwing themselves on the mercy of the community or of the hospital to which they came, the doctors believe.

The patients unconsciously hope that someone will apply the patience and imagination to their problems that they themselves do not possess.

But their cooperation is often difficult to obtain, the physicians explained. They were relieved of their problems by the "magic" of memory loss and prefer to remain dependent on the "magician" rather than resume the responsibility for their own lives.

Amnesia is caused by both organic brain disturbances and emotional upsets. Sometimes both conditions were found in one patient and it was difficult to tell which actually caused the memory loss.

Psychological causes of memory loss are frequently situations relating to marriage, bigamy, debt, or other financial troubles where there is an element of fear or conflict. Rather than face the situation, the patient just blots it out of his mind by forgetting it completely.

This type of amnesia rarely lasts longer than a few hours or days and may or may not include the loss of identity.

Science News Letter, September 7, 1957

AGRICULTURE

British Experiment With Farming After an H-Bomb

➤ A FARM near Newbury, England, not far from the Harwell Atomic Research Station, is looking as though it is being cultivated by creatures from outer space. The whole farm has been sealed off by a chain-link fence and the farm hands go about their jobs dressed in spacemen suits of plastic and carrying respirators.

The farm land itself has been made radioactive to simulate contamination from an H-bomb explosion. Experiments are being carried out to determine how soon it would be safe to eat produce from a contaminated field, whether special methods of cultivation would bring the affected fields into use more quickly and how much radioactive dust finds its way out of the soil into crops.

Even the tractors and agricultural implements have been fitted with plastic jackets, so that every trace of radioactivity can be removed from them.

Because strontium-90, the most dangerous part of H-bomb fallout, would contaminate the land for years, the researchers, headed by Dr. R. Scott-Russell, are using strontium-89, which is almost equally as radioactive but has a half-life of only 54 days.

With the strontium-89 it is possible to make the necessary experiments and measurements directly, but the amount of simulated fallout so far revealed has been so small that extremely sensitive and elaborate equipment has been needed for the experiments.

The first results of the tests show that there is little hope of bringing contaminated land back into use more quickly by changing the pattern or method of cultivation. On the other hand, some considerable speed-up could be achieved by selecting crops which do not pick up so much radioactivity and sowing them in contaminated areas.

Science News Letter, September 7, 1957

ASTRONOMY

Hydrogen Halo Surrounds Galaxy

➤ A TWIN GALAXY of the Milky Way in which the earth and sun are located, a heavenly object known as M-33, is surrounded by a huge halo of hydrogen gas.

This discovery, made with the 60-foot radio telescope of Harvard College Observatory, is reported in the *Publications of the Astronomical Society of the Pacific* (Aug.) by Dr. Nannielou H. Dieter. She says the hydrogen extends "far beyond" the spiral structure visible on available photographs.

The hydrogen halo was detected by tuning in on the radio waves broadcast at a wavelength of 21 centimeters, or 8.4 inches. The radio signals come from neutral hydrogen atoms in the far-away galaxy.

M-33 is one of the galaxies near the Milky Way and is often used to illustrate how the Milky Way might look to a very distant observer. Just as the Milky Way does, it has thousands of millions of stars. The mass of the entire system, including the hydrogen halo, is ten billion times that of the sun, Dr. Dieter has calculated.

The 21-centimeter radio waves broadcast by hydrogen atoms in interstellar space were first discovered almost simultaneously in the United States, Australia and the Netherlands in 1951. Their existence was predicted by astronomer Dr. H. C. van de Hulst of Leyden Observatory, The Netherlands, in 1944.

Science News Letter, September 7, 1957

VIROLOGY

Healthy Chicken Tissue Has Cancer-Causing Virus

➤ THE VIRUS-LIKE particles thought to cause a specific type of cancer in chickens, Rous sarcoma, have been found to exist even in normal young chickens.

This is reported by Drs. Ch. Oberling, W. Bernhard and Ph. Vigier, Gustave Roussy Institute for Cancer Research, Villejuif, Seine, France, in *Nature* (Aug. 24).

The particles were closely examined under an electron microscope and found to have two distinct outer membranes surrounding a dense central core, a fact the scientists believe to be quite important. Although this might appear to be a minor detail at first, it shows a similarity with certain evolutionary stages of other known viruses, they report.

One such virus, named the Bittner virus, has its outer viral membrane formed by a very small portion of the membrane of the cell from which it originates.

A similar occurrence may explain the data showing Rous sarcoma virus to have two antigens, one against its host cell. This host antigen may be contained in the outside viral membrane.

Why the double-membraned virus exists in normal tissue is not understood.

The authors believe all chicken tissue may have a substance within it that can become cancer-producing under the right conditions and the virus supplies these conditions.

Science News Letter, September 7, 1957

GEOLOGY

World's Deepest Mine

At the Kolar Gold Field in India man has burrowed almost two miles into the earth to take out one of his most precious metals.

By BARBARA TUFTY

➤ IN SEARCH OF gold, man has burrowed nearly two miles into the earth at the Kolar Gold Field in India, the deepest mine in the world. Here temperatures are so high and rock pressures so great that solid rock is beginning, almost imperceptibly, to flow into the open excavations—yet man still digs deeper at the rate of 250 feet per year.

On the hot plains of South India, 13 degrees north of the equator, stand gaunt headings of three mining companies, recently nationalized by the Mysore State Government from the British concern, John Taylor and Sons, Ltd. These derricks mark entrances into a 650-mile network of tunnels that stretch 10,030 feet below the surface of the earth.

Here man is encountering mining problems in intensities never before met, according to John K. Walker, manager of Champion Reef Mine, deepest and one of the most prolific of the mines.

As man digs through the crust of the earth, rock temperatures increase one degree Fahrenheit for every 110 feet. At the bottom of deep shafts, rock temperatures are 150 degrees Fahrenheit, hottest mining temperatures yet encountered. Heavy pressures built up from excavations release inherent stresses in the ancient rock and cause some of the most violent and frequent "rock bursts" ever recorded. And at these new plumbed depths, Mr. Walker went on to say, man is beginning to find that the rock is stressed beyond its natural rigid state and it is possible to find evidence of the commencement of a gradual plastic flow.

Yet from these problematical tunnels have trickled over 958 tons of gold during the past 83 years when the area has been technically mined. A thousand years ago, people began digging the gold with primitive tools and methods of quenching heated rock with water to demolish the gold-bearing quartz. Today, Kolar Gold Field leads the world in deep-mining techniques, and 98% of the gold is removed from its surrounding rock, the highest gold recovery anywhere. The yellow-green metal streams from these fields at a rate of 20,000 ounces each month, about three percent of the total world output.

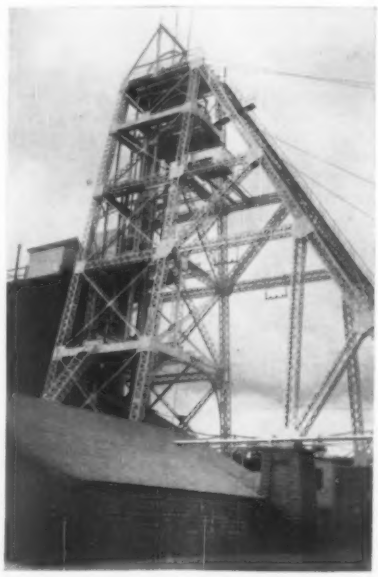
Gold-Bearing Reefs

The finely divided gold, normally invisible to the eye, occurs in 26 quartz reefs or veins which run north and south through hard schist rock. At the surface, these reefs slant into the earth at a 45-degree angle, but they become nearly vertical at greater depths. The reefs are three or four feet wide on the average, but sometimes swell out to 25 feet or dwindle to a foot. They were formed millions of years ago by volcanic action which squeezed the gold-containing quartz into the hornblende schist, one of the hardest and most ancient rocks in the world.

The indigenous country rock at Kolar is exceptional in its unyielding nature and its high resistance to rupture. This means it resists heavy pressures, but when stressed beyond its rupture point, the rock explodes with violence. Geologically of great age, the hornblende schist possesses internal pressures which are violently released after excavation.

When a rock explodes in a "rock burst," the shock wave may be felt many miles away and, like a small earthquake, causes considerable damage even to buildings above the earth's surface. Normally, pressure in mine workings is relative to depth, commented Mr. Walker, but in these mines, rock bursts have occurred almost as frequently at 500 feet as at 10,000 feet.

Rock bursts at Kolar occur more frequently and with more destructive and widespread effects than at any other mining field.



GOLD TOWER—Beneath this girdered tower men work almost two miles underground digging for gold. Topping off the deepest mine in the world at the Kolar Gold Field in India, this derrick marks the entrance to a 650-mile network of tunnels.

Other mines encountering rock burst problems throughout the world include the copper mines of the United States, the copper, gold and nickel mines of Canada, and the gold mines of South Africa. Rock bursts are also occurring with some intensity in the coal mines of the United States, Nova Scotia, India, and in the United Kingdom and the continent of Europe.

In order to minimize and localize the damaging effects of rock bursts at Kolar, the rock is mined in strict sequence, in accordance with what engineers have learned about ground control and rock bursts. Extraordinarily careful measures are taken to prevent building up over-great stresses in the rock, and to investigate constantly the areas where a burst might occur.

Granite "Plugs" Prevent Bursts

Most important preventive measure to ease devastation from rock bursts is the huge job of packing granite blocks into the "stopes" from which the reef has been extracted. These granite cubes, 8 or 12 inches in size, are quarried above surface and then lowered underground in trucks. There they are carefully packed, stone by stone, against each other to form three-dimensional jigsaw walls which are more or less continuous and rigid. Each month, more than 5,000 tons of granite blocks are lowered and fitted into these reef excavations. This of course entails tremendous costs and a slowing down of production in the mines. Before further reefs can be excavated, abandoned reefs must be refilled with granite to offset pressures. Eighty-five percent of the area mined at Kolar is now plugged in this manner.

As other preventive measures against sudden explosions, Kolar tunnels are girded with heavy steel rails every three and a half feet, and strapping steel pieces are bolted into the rock walls.

At 10,000 feet the virgin rock temperature is 150 degrees Fahrenheit. Work at these depths would be impossible without two air-conditioners which send dehydrated air cooled to 37 degrees Fahrenheit down shafts at the rate of 125,000 cubic feet per minute. By the time this air reaches the shaft bottom, its temperature has increased to 86 degrees, and when it reaches the far ends of the tunnels, it is 125 degrees hot. Another cooling plant will soon be placed 8,000 feet below the surface, explained Mr. Walker—the first air-conditioner at this depth.

In the constant heat, machine crews find their machines so hot to operate that they have to use a piece of sacking to protect their hands. Steel drills, ladders, buttresses and other metal equipment are hot to handle. Water is too hot for drinking, and supplies of cool water have to be lowered and retained in coolers at each level. Water is normally drunk with salt to prevent muscular cramp resulting from saline losses when the men perspire excessively.

Workers acclimatize to the hot working

conditions fairly quickly, commented Mr. Walker. After about a week, the sweat glands of a new laborer adjust to the high temperatures, and he sweats profusely in nature's own method of counteracting heat.

Flowing Walls of Rock

As a result of the enormous pressures in some of the deepest tunnels of Champion Mine, Mr. Walker stated, hornblende schist walls are showing evidences of a natural plasticity which accentuates the normal closure of the rock to such an extent that within 24 hours after initial drilling, walls have sometimes perceptibly moved into the excavation as much as six inches.

The deep mines are reached from the surface by circular shafts which vary from 4,000 to over 6,500 feet in depth.

One of the deepest single-wind shafts in the world permits men to plunge in an elevator cage nearly one and one-half miles straight into the earth in about three minutes. This is Gifford's shaft on the Champion Mine, a circular shaft 18 feet in diameter which reaches 6,586 feet deep. Two steel ropes, each weighing 20½ tons, pull two double-decked cages made of duraluminum, each capable of carrying 50 men or five tons of ore.

Present official estimate is that the Kolar mines will continue probing the earth to the depth of 11,500 feet. Controlling factors for reaching these great depths are threefold, Mr. Walker said: rock pressure, ventilation and plastic flow. Kolar gold mines have advanced as far as feasible by existing methods of mining, he added.

The problems now seem rather beyond the province of the practical mining engineer and have entered the field of the scientist and the specialist.

Science News Letter, September 7, 1957

MEDICINE

Car Headrest Stops Whiplash Neck Injury

➤ A CAR HEADREST that prevents whiplash injuries of the neck during highway accidents was recommended by Dr. Albert D. Ruedemann Jr. of Detroit, in the *Journal of the American Medical Association* (Aug. 24).

Whiplash injuries occur when a car is struck in the rear and its occupants have their heads snapped back. Both super highways and the new lower seat models are factors causing an increasing number of such injuries, Dr. Ruedemann reports.

The headrest is six inches wide, six inches high and is fitted on the top of the present seat. It follows the backward curve of the seat so that the driver cannot rest his head on it and become drowsy.

An experimental model that can be screwed to the seat frame and is removable was made by officials at the Chrysler Corporation.

It should be used along with a shoulder-type seat belt to keep the body from being thrown forward, Dr. Ruedemann recommends.

Science News Letter, September 7, 1957

Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N. W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

☐ **POLYETHYLENE** *by Theodore O. J. Kresser.* Covers this exciting new material in respect to its uses and why it is frequently preferable to other materials. Emphasizes a practical and selective method which features representative applications with a liberal use of illustrations. Includes recent advances in the field, and their future importance to industry. 1957, $4.95

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☐ **THE CONDENSED CHEMICAL DICTIONARY,** *New 5th Edition edited by Arthur and Elizabeth Rose.* Over 30,000 revised, up-to-date entries; 1,220 double-column pages as compared with 760 pages in the previous edition; more than 6 years in preparation; enormously expanded trade name information obtained directly from producers; thumb-indexed for quick reference; larger, easier-to-read print. 1956, $12.50

☐ **ORGANIC CHEMISTRY,** *New 3rd Edition by Louis F. and Mary Fieser.* Now larger, more complete, thoroughly revised and brought up to date. Develops in orderly sequence the principles and concepts of modern organic chemistry and the applications of fundamental science to technology, biochemistry, and medicine. Covers latest developments in theory and organic structures. 1956, $10.00

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☐ **PLASTICS ENGINEERING HANDBOOK of The Society of the Plastics Industry, Inc.** Contains exhaustive, well-arranged engineering information on the design, materials, processes, equipment, finishing, assembly, testing and standards of plastics and plastic products. Entirely rewritten, this new edition of the famous SPI Handbook is almost twice its former size. Suppliers of raw materials will find a complete set of accepted standards and specifications. Designers and engineers will find new testing methods fully described. Users of plastics will welcome the standards for testing, rating, certifying and labeling plastic commodities. 1954, $15.00

☐ **GAS CHROMATOGRAPHY** *by A.I.M. Keulemans.* The modern magic of gas chromatography is now for the first time completely spelled out in both its practical and theoretical aspects. Here is a concise practice manual and an authentic, up-to-the-minute summary of the field written by chemists who have been among the most active investigators of all varieties of chromatography.
1957, $7.50

☐ **HANDBOOK OF FOOD & AGRICULTURE** *edited by F. C. Blanck.* Over 1,000 pages of expert information on the newest applications of science to the food and agricultural fields! Covers: soils and plant growth; fertilizers; insecticides; growth regulants; essential nutrients; storage of raw products; food processing; preservation; packaging; quality control; waste disposal; and many other important topics. 1955, $15.00

☐ **BIOLOGICAL TREATMENT OF SEWAGE AND INDUSTRIAL WASTES,** *Volume 1, edited by McCabe and Eckenfelder.* Covering aerobic oxidation, this volume describes the principles of bio-oxidation, the theory of oxygen transfer, and the design and operation of typical sewage and industrial waste treatment processes. 1956, $10.00

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AN A.B.C. OF AERONAUTICS—L. L. Beckford—*Pitman*, 114 p., illus., $3.95. A dictionary of aeronautical terms from absolute ceiling to zoom. The meaning of the latter term, incidentally, is given as "To use the momentum of a dive or speed in level flight to attain altitude rapidly."

ANESTHESIA AND OTOLARYNGOLOGY—Donald F. Proctor—*Williams & Wilkins*, 267 p., illus., $7.00. What the anesthetist needs to know about the problems of ear, nose and throat surgery.

AN APPROACH TO MODERN PHYSICS—E. N. da C. Andrade—*Doubleday*, 266 p., illus., paper, 95 cents. Intended primarily for readers with no extensive training in science or mathematics, this book sets forth the basic laws of nature and tells how they were reached.

THE ATLANTIC: A History of an Ocean—Leonard Outhwaite—*Coward-McCann*, 479 p., illus., $6.50. The Atlantic is the chief drainage basin of all the major continents. Its story tells of how man first learned to travel on the seas and the effect the ocean has had on how men think and feel.

ATOMIC ENERGY COMMISSION TWENTY-SECOND SEMIANNUAL REPORT—Lewis L. Strauss, Chairman—*Govt. Printing Office*, 257 p., illus., paper, 75 cents. During the first six months of 1957, steady progress was made in promoting the free world's use of atomic energy for mankind's benefit and in developing nuclear weapons.

C.R.C. STANDARD MATHEMATICAL TABLES—Charles D. Hodgman, Ed.-in-Chief—*Chemical Rubber Publishing Co.*, 11th ed., 480 p., $3.00. Many changes have been incorporated in this new edition to make the book increasingly useful.

DAIRY BACTERIOLOGY—Bernard W. Hammer and Frederick J. Babel—*Wiley*, 4th ed., 614 p., illus., $9.00. The content is that of the beginning course in the subject at Iowa State College.

ELECTRONS GO TO WORK—J. Gordon Cook—*Dial*, 192 p., illus., $3.00. In the last half century, the electron has worked wonders in the world of physics and engineering.

IRON ORE BENEFICIATION—Lawrence A. Roe—*Minerals Publishing Company*, 305 p., illus., $5.00. Purpose of the book is to bring together the many scattered bits of information on the processing of iron ore.

JOURNAL OF MOLECULAR SPECTROSCOPY: Volume 1, Number 1, July, 1957—Harald H. Nielsen—*Academic*, 80 p., illus., paper, Volume 1, 4 issues $10.00, single issues $3.00. Devoted to publication of original research papers dealing with both the experimental and the theoretical aspects of molecular spectroscopy.

LABORATORY EXPERIMENTS IN COLLEGE PHYSICS—Cicero Henry Bernard—*Ginn*, 2d ed., 328 p., illus., paper, $4.25. A laboratory manual intended to accompany the standard first-year course in college physics.

MEREDITH'S SCIENCE OF HEALTH—Warren H. Southworth and Arthur F. Davis—*McGraw-Hill*, 3d ed., 492 p., illus., $5.00. This edition is brought factually up to date and contains a new 8-page color atlas of human anatomy.

NEW FRONTIERS OF KNOWLEDGE: A Symposium by Distinguished Writers, Notable Scholars & Public Figures—M. B. Schnapper, Ed.—*Public Affairs Press*, 125 p., $2.75. Based on a series of talks broadcast throughout the world by the U. S. Information Agency.

NOBEL PRIZE WINNERS—L. J. Ludovici, Ed.—*Associated Booksellers*, 226 p., illus., $3.75. A collection of brief biographies of eight winners of Nobel Prizes in literature and six in science.

THE ORIGINS OF PSYCHOANALYSIS: Letters, Drafts and Notes to Wilhelm Fliess, 1887-1902—Sigmund Freud, edited by Marie Bonaparte, Anna Freud, Ernst Kris, authorized translation by Eric Mosbacher and James Strachey, introduction by Ernst Kris—*Doubleday*, 384 p., diagrams, paper, $1.25. These letters, the editors explain, do not reveal any "secrets" of the private life of the great Freud, but they do amplify the early history of psychoanalysis.

POLYETHYLENE—Theodore O. J. Kresser—*Reinhold*, 217 p., illus., $4.95. The status of applications at this time and a little history and projection to give perspective.

QUANTITATIVE ORGANIC ANALYSIS—James S. Fritz and George S. Hammond—*Wiley*, 303 p., diagrams, $6.50. A previous course in elementary physical chemistry is desirable but not essential to the understanding of this text.

RUSTY RINGS A BELL—Franklyn M. Branley and Eleanor K. Vaughan—*Crowell*, illus. with drawings by Paul Galdone, $2.50. A book for little children telling how a boy with a bad cold found diversion in learning how to put a doorbell together.

SEMICONDUCTORS: Their Theory and Practice—G. Goudet and C. Meuleau with a preface by E. M. Deloraine, translated by G. King—*Macdonald and Evans (Essential Books)*, 316 p., illus., $18.90. To understand the nature of these weight-and power-saving elements, there is need for theoretical ideas outlined here.

A STUDENT'S HISTOLOGY—H. S. D. Garven—*Livingstone (Williams & Wilkins)*, 650 p., illus., $11.00. A textbook for the study of tissues.

SYSTEMATIC ORGANIC CHEMISTRY: Theory and Applications—Hugh C. Muldoon and Martin I. Blake—*McGraw-Hill*, 828 p., illus., $7.75. A text for the general student.

VANGUARD! The Story of the First Man-Made Satellite—Martin Caidin—*Dutton*, 288 p., illus., $3.95. Telling of the plans for this important American participation in the International Geophysical Year.

VIRUS IN THE CELL—J. Gordon Cook—*Dial*, 208 p., illus., $3.00. In spite of the revolution in disease fighting caused by modern drugs, we still have nothing to use against the virus. This book on what can be done is written for the layman.

WE LIVE BY THE SUN—J. Gordon Cook—*Dial*, 192 p., illus., $3.00. Telling the story of light and how it affects the daily life of everyone.

Using a failure predictor device, a single operator at a central location now can monitor the performance of many *radars* at remote areas.

The average personal *income* after taxes, in terms of today's dollar, has gone up from about $900 a year in 1935 to about $1,700 a year for every man, woman and child in the U. S.

Molybdenum first gained prominence as a substitute for tungsten and an ingredient of new alloys during World War I.

BIOLOGY

Biologists on Verge of Major Discoveries

➤ BIOLOGISTS are on the verge of discoveries equal to the "revolutionary and potentially devastating kind" that have led to the production of atomic bombs and intercontinental ballistic missiles.

Dr. H. Bentley Glass of Johns Hopkins University, Baltimore, Md., giving the principal address of the American Institute of Biological Sciences meeting, warned more than 3,000 of his colleagues they would do well "to observe soberly the conscience-stricken efforts of some atomic scientists."

He observed that the biological scientists were "divinely ignorant" of what effect their biological discoveries will have in altering human life. This is their ivory tower. However, a little comprehension of human history and the inescapable nature of human society, of human motives and human values, Dr. Glass pointed out, might save us in time.

Power, especially unlimited power, can be more of a danger than a blessing, Dr. Glass said, and cautioned that if man were sufficiently foolhardy, this age may constitute "the last chapter of human history, the terminus of the time-scale.

"Today we stand on the verge of biological discoveries of an equally revolutionary and potentially devastating kind, which it will require all our wisdom to control."

Calling the ignorance of what biologists will do with discoveries that can alter human life the biologists' "quandary," Dr. Glass challenged his colleagues to preserve freedom of thought in the growth of science.

This same freedom, he said, can be lost in a matter of months, even though it was gained through "centuries of struggle."

"We face new problems in this area which are likely to become critical in the next years. The domination of scientific research by the holders of the purse-strings is ominous, even though until now our foundations and government agencies have pursued policies of the most liberal kind. How long may that be expected to continue if the people, and the representatives of the people, feel that science is a useful servant, or slave, to minister to the needs of society as bidden?"

The answer, Dr. Glass said, could be found by looking at the Soviet Union.

"Within our universities," he continued, "problems of the domination of scientists threaten to arise in the choice of their experimental problems and the publication of their results, should these chance, for example, to bear unfavorably on large industries (tobacco), or local interests (butter), or to conflict with deeply held prejudices (racial segregation)."

It is distressing, Dr. Glass said, "that so relatively few biologists are to be found in the ranks of the American Association of University Professors or the American Civil Liberties Union or other organizations that defend the essential freedom of science."

(See pp. 147, 149 and 150 for other articles on research reported at the meeting.)

Science News Letter, September 7, 1957

Questions

BIOLOGY—What is the name of the amino acid formed by the action of photosynthetic sulfur bacteria on carbon dioxide? p. 149.

GEOLOGY—In what kind of rock are Kolar mine's gold-bearing veins found? p. 154.

PUBLIC HEALTH—How many chromosome breaks per 100 cells were produced when human kidney tissue cells were exposed to 25 roentgens? p. 147.

RADIO ASTRONOMY—How does Jupiter's ionosphere compare with the earth's? p. 152.

Photographs: Cover, General Electric Company; p. 147, Perkin-Elmer Corp.; p. 149, University of Washington; p. 151, Aerojet-General Corp.; p. 154, Mysore Gold Mining Company, Ltd.; p. 160, Martin-Senour Co.

SOCIOLOGY

Research Efforts Help Professor's Advancement

➤ A COLLEGE professor's prestige among his colleagues and his ability to advance in his profession do not depend on the quality of his teaching, Dr. Theodore Caplow of the University of Minnesota told the American Sociological Society meeting in Washington.

In fact, successful teaching may even count against the professor.

With minor exceptions, Dr. Caplow found in interviews with heads of department and professors in ten major universities, a professor's prestige among his colleagues depends upon his research productivity.

The central fact affecting the change of jobs by college professors is the gap between major and minor institutions. Most moves across the gap are downward. Moves upward occur only under special circumstances.

Movement is affected more by the push of dissatisfaction, either on the part of the professor or his institution, than it is by the pull of outside opportunity.

The factors governing the movement of professors at present are unfavorable both to the individual and to the institution, Dr. Caplow concluded.

Science News Letter, September 7, 1957

Do You Know?

The losses caused by *rheumatic diseases* to the nations of the world are far greater than the losses suffered during all the wars ever fought by man.

A peculiar *hormone* has been harvested from enormous volumes of worm-like larvae which matures insects and prevents or shrinks tumors, and it is now being tested against cancers in mice.

Scientists are now using radioactive tracers in cows to study the development of *milk*.

A new health hazard to *farmers*—the production of a deadly gas in silos—has been established by medical research workers.

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RUSTPROOF PULLEY is a combination of a pearl-white, colorfast tenite-butyrate plastic wheel and an aluminum bracket. The bracket has a tongue that serves as a clothesline guide and a large hole for anchoring with an extra heavy hook. The pulley is also described as snagproof.

Science News Letter, September 7, 1957

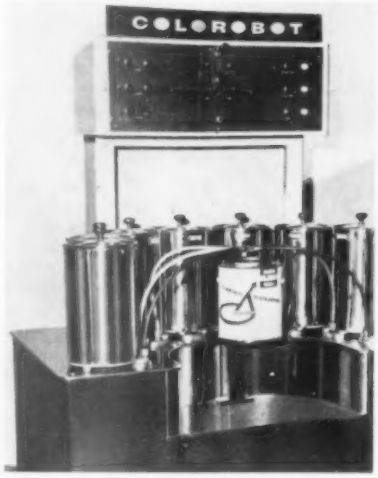
READY-TO-USE COATING adheres *to galvanized and other smooth metal surfaces. It is described as weatherproof and requiring no etching or acid treating of the metal beforehand. The primer and protector can be applied to new, old, unpainted or rusty galvanized surfaces.*

Science News Letter, September 7, 1957

ILLUMINATED TRACING UNIT is portable and lightweight. It can be used for photographic, reproduction or drafting work, as well as under a straight edge or drafting machine. Made of shatterproof opal Plexiglas, the unit is available in several tracing surface sizes.

Science News Letter, September 7, 1957

COLOR SELECTOR permits a paint buyer to pick out any color he or she wants by inserting a card into an automated reader. Within a few seconds, the robot device shown in the photograph has the exact selected color mixed and ready to



take home. Eight controlled colorants are used for addition to standard quart, gallon or five-gallon cans.

Science News Letter, September 7, 1957

TELEPHONE OR BOTTLE HOLDER is made of a semi-rigid flexible steel arm with interchangeable holders. Designed for home or office, the arm can be clamped to a bed, dresser, desk or crib and held in the position desired.

Science News Letter, September 7, 1957

PLASTIC CAPS for the exposed ends of pegs mounted on boards to hold pots, pans, tools and other items are available in black, red, turquoise, yellow and white. The colorful tabs are designed to fit peg fixtures measuring either one-eighth or one-fourth of an inch.

Science News Letter, September 7, 1957

CEILING TILE for the do-it-yourself home handyman. For installation, the 12-by-12-inch tiles can be nailed or stapled to one-by-three-inch furring strips. The staples or nails are hidden by the tile joints. The sound-proofing material is said to absorb up to 20 times more sound than an ordinary ceiling.

Science News Letter, September 7, 1957

STOP LIGHT designed to be fixed to the left front fender of an automobile gives extra warning that your car is slowing down. The light can be adjusted to any height and is hooked up to the brake pedal. The motion of the automobile stopping causes the safety light to vibrate. The light is legal in 19 states.

Science News Letter, September 7, 1957

Nature Ramblings

By HORACE LOFTIN

The Big Bad Carnivores

➤ FROM INFANCY on, we humans delight in tales in which nice little herbivores escape from the clutches of big bad carnivores.

Aesop's fables bear out this theme. Then came Br'er Fox versus Br'er Rabbit. More recently, the movie cartoons with Tom versus Jerry or the "wittle bird who thought he saw a putty tat" have elaborated on the subject.

When considered simply as tales for children's entertainment, such stories of the "good" versus the "bad" animal certainly have their place. However, these designations of good and bad are often carried over in the minds of adults, to the disadvantage of the predatory, meat-eating animals. A fox then is seen as a villain to be hunted and killed, not as a necessary figure in nature's balance. The coyote is an assassin, and his role in preventing over-population of grass-eaters is forgotten or ignored.

In a fictional Utopia, supposedly there would be no big bad carnivores to prey on the lesser beasts.

Australia proved such a Utopia to rabbits which were transplanted there from Europe. In that new land, there were no native predators to keep their numbers under control.

As a result, the rabbit population grew by leaps and bounds, creating destructive competition for native wildlife and comprising an economic burden for humans. A deadly rabbit disease had to be introduced into Australia in order to control the number of rabbits.

In our own country, war was declared against predators in 1906 in the Grand Canyon National Game Preserve. This was done to protect the deer. Hunting the deer was prohibited, and in some 20 years at least 781 mountain lions, 30 wolves, 4,889 coyotes and 544 wild cats were slaughtered there. The deer herd numbered about 4,000 at the beginning of the campaign. By 1924, the herd numbered 100,000!

But then came the predictable disaster. In the winter of 1924, the vegetation of the Preserve was wiped out by the tremendous herd. The deer that did not die then stripped trees of leaves and twigs until "the whole country looked as though a swarm of locusts had swept through it." Deer died by the thousands from starvation.

The way to prevent this situation would have been to leave the predators untouched and to allow controlled hunting of the deer herd. It took many years thereafter to restore the balance of nature to that area, thrown out of kilter by man's good intentions.

There are no good and bad animals. All are necessary parts of the whole we call "nature."

Science News Letter, September 7, 1957